WHAT IS CLAIMED IS:

1. A torque transmitting apparatus for transmitting a torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion; and

a torque transmitting member for transmitting the torque that said first rotor has received to said second rotor, said torque transmitting member being deformable elastically, wherein

said torque transmitting member has a non-linear spring characteristic.

2. A torque transmitting apparatus for transmitting a torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion; and

a torque transmitting member for transmitting the torque that said first rotor has received to said second rotor, said torque transmitting member being deformable elastically, wherein

said torque transmitting member is deformed mainly by a flexural deformation when an amount of deformation is less than a predetermined amount, and is deformed mainly by a compressive deformation when the amount of deformation is more than the

predetermined amount, whereby an elastic modulus of said torque transmitting member at the amount of deformation over the predetermined amount becomes larger than that at the amount of deformation below the predetermined amount.

3. A torque transmitting apparatus according to claim 2, wherein

said torque transmitting member is made of rubber or elastomer having a hole, and

the hole reduces a cross-sectional area in a cross-section nearly perpendicular to a load direction.

4. A torque transmitting apparatus according to claim 2, wherein said torque transmitting apparatus is made of rubber or elastomer and has a shape which extends in a load direction while meandering.

5. A torque transmitting apparatus according to claim 2, wherein said torque transmitting member is made of rubber or elastomer in V or S shape.

6. A torque transmitting apparatus according to claim 2, wherein said torque transmitting member includes plural members having different elastic modulus.

7. A torque transmitting apparatus for transmitting a torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source, said first rotor defining a first curved surface;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion, said second rotor disposed coaxially with said first rotor, said second rotor defining a second curved surface facing said first curved surface; and

an elastically deformable elastic member disposed between said first curved surface and said second curved surface, said elastic member being compressed by said first and second curved surfaces to transmit the torque from said first rotor to said second rotor, wherein

a radius of curvature and a center of curvature of said first curved surface and a radius of curvature and a center of curvature of said second curved surface are different from each other, and

a change rate of a distance between said first and second curved surfaces at a time when a relative rotational angle of said first rotor with respect to said second rotor exceeds a predetermined amount is larger than a change rate of the distance between said first and second curved surfaces at a time when the relative rotational angle lessens the predetermined amount.

8. A torque transmitting apparatus according to claim 7, wherein

said curved surface of said first rotor is positioned on a more radially outer than said second curved surface of said

second rotor,

the radius of curvature of said first curved surface is smaller than the radius of curvature of said second curved surface, and

said first and second curved surfaces are convex toward a rotational center of said first and second rotors.

9. A torque transmitting apparatus for transmitting a torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source; and

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion, said second rotor being disposed coaxially with said first rotor, wherein

an outer periphery of said second rotor is generally star-shaped so as to have a plurality of projections,

a smooth curved surface is formed between said adjacent projections,

pins each having a circumferential surface with a radius smaller than a radius of curvature of said curved surface are provided in said first rotor so as to be each positioned between said adjacent projections, and

an elastically deformable elastic member is disposed on said curved surface.

10. A torque transmitting apparatus for transmitting a

torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion, said second rotor disposed coaxially with said first rotor;

an elastically deformable torque transmitting member being compressed to transmit the torque that said first rotor has received to said second rotor, wherein

said torque transmitting member includes first and second transmitting members accommodated within a same space,

respective portions of said first and second transmitting members substantially parallel to a compressive load direction are different in size from each other,

when a relative rotational angle of said first rotor with respect to said second rotor is less than a predetermined rotational angle, said first transmitting member mainly transmits the torque by undergoing a compressive deformation, and

when the relative rotational angle exceeds the predetermined rotational angle, said first and second transmitting members share each other in bearing the compressive load to transmit the torque.

11. A torque transmitting apparatus according to claim 10, wherein a compressive deformation rate of said second transmitting member and a compressive deformation rate of said first transmitting member are different from each other.

12. A torque transmitting apparatus according to claim 10, wherein

said first transmitting member is a metallic spring formed in a coil shape, and

said second transmitting member is made of rubber or elastomer and serves also as a spring seat for holding the metallic spring.

13. A torque transmitting apparatus for transmitting a torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion, said second rotor disposed coaxially with said first rotor;

an elastically deformable torque transmitting member being compressed to transmit the torque that said first rotor has received to said second rotor, wherein

said torque transmitting member is formed so that a change rate of transmission torque with respect to a relative rotational angle of said first rotor at a time when said first rotor rotates over a first predetermined angle in a forward direction with respect to said second rotor is larger than the change rate at a time when said first rotor rotates below a second predetermined angle, which is smaller than the first predetermined angle, in a reverse direction with respect to said second rotor.

14. A torque transmitting apparatus according to claim 13, wherein

said torque transmitting member includes a first deforming portion which undergoes a compressive deformation when said first rotor rotates in the forward direction with respect to said second rotor and a second deforming portion which undergoes a compressive deformation when said first rotor rotates in the reverse direction with respect to said second rotor, and

said second deforming portion includes a hole for reducing a cross-sectional area in a cross-section nearly perpendicular to a load direction.

15. A torque transmitting apparatus according to claim 14, wherein said first deforming portion is formed so that as the relative rotational angle increases, the change rate increases.

16. A torque transmitting apparatus according to claim 14, wherein a plurality of torque transmitting members are disposed circumferentially and said plural torque transmitting members are connected through a connecting member.

17. A torque transmitting apparatus according to claim 13, wherein said torque transmitting member is made of rubber or elastomer.

18. A torque transmitting apparatus for transmitting a

torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion, said second rotor disposed coaxially with said first rotor;

first and second torque transmitting members accommodated respectively within plural spaces formed in a circumferential direction within said first and second rotors, said first and second torque transmitting members being elastically deformable and undergoing a compressive deformation to transmit the torque that said first rotor has received to said second rotor, wherein

before the compressive deformation of said second torque transmitting member, an inner wall of the space where said second torque transmitting member is accommodated out of the plural spaces is spaced by a predetermined gap from said second torque transmitting member in a compressive load direction, and

when said first torque transmitting member is compressively deformed by a predetermined amount or more, the predetermined distance vanishes and a compressive load is imposed on said second torque transmitting member.

19. A torque transmitting apparatus according to claim 18, wherein out of the plural spaces, a first space where said first torque transmitting member is accommodated and a second space where said second torque transmitting member is accommodated are arranged alternately in the circumferential direction.

20. A torque transmitting apparatus according to claim 19, wherein a size of a portion of the second space which is nearly parallel to the circumferential direction is larger than a size of a portion of the first space which is nearly parallel to the circumferential direction.

21. A torque transmitting apparatus according to claim 19, wherein a size of a portion of said first torque transmitting member which is nearly parallel to the circumferential direction is larger than a size of a portion of said second torque transmitting member which is nearly parallel to the circumferential direction.

22. A torque transmitting apparatus according to claim 18, wherein a compressive deformation rate of said first torque transmitting member at a time when the compressive load is imposed on said first torque transmitting member is smaller than a compressive deformation rate of said second torque transmitting member at a time when the compressive load is imposed on said second torque transmitting member.

23. A torque transmitting apparatus for transmitting a torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion, said

second rotor disposed coaxially with said first rotor; and

an elastically deformable torque transmitting member being compressed to transmit the torque that said first rotor has received to said second rotor, wherein

when a relative rotational angle of said first rotor with respect to said second rotor is smaller than a predetermined rotational angle, said torque transmitting member undergoes a compressive deformation so that a cross-sectional area in a cross-section nearly perpendicular to a direction of a compressive load imposed on said torque transmitting member increases, and

when the relative rotational angle is more than the predetermined rotational angle, said torque transmitting member undergoes a compressive deformation while inhibiting an increase of the cross-sectional area.

24. A torque transmitting apparatus for transmitting a torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion, said second rotor disposed coaxially with said first rotor; and

a torque transmitting member accommodated within a space formed within said first and second rotors, said torque transmitting member being deformable elastically and undergoing a compressive deformation to transmit the torque that said first rotor has received to said second rotor, wherein

when a compressive load is not imposed on said torque transmitting member, a gap is formed between a portion of an inner wall of the space which is nearly parallel to a direction of the compressive load and said torque transmitting member.

25. A torque transmitting apparatus for transmitting a torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion, said second rotor disposed coaxially with said first rotor; and

a torque transmitting member accommodated within a space formed within said first and second rotors, said torque transmitting member being deformable elastically and undergoing a compressive deformation to transmit the torque that said first rotor has received to said second rotor, wherein

an end portion of said torque transmitting member in a direction nearly parallel to a direction of a compressive load acting on said torque transmitting member is tapered so as to be smaller in cross-sectional area toward a front end side thereof, and

when the compressive load is not imposed on said torque transmitting member, a gap is formed between an inner wall of the space and said torque transmitting member.

26. A torque transmitting apparatus for transmitting a

torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion, said second rotor disposed coaxially with said first rotor; and

a torque transmitting member disposed within a space formed within said first and second rotors, said torque transmitting member being deformable elastically and undergoing a compressive deformation to transmit the torque that said first rotor has received to said second rotor, wherein

said torque transmitting member is deformed compressively so that at least when a relative rotational angle of said first rotor with respect to said second rotor is smaller than a predetermined rotational angle, as the relative rotational angle increases, an area of contact between a portion of an inner wall of the space which is nearly parallel to a direction of a compressive load and said torque transmitting member increases.

27. A torque transmitting apparatus for transmitting a torque from a driving source to a rotary device, comprising:

a first rotor rotating upon receipt of the torque from said driving source;

a second rotor connected to a rotating portion of said rotary device and rotating together with said rotating portion, said second rotor disposed coaxially with said first rotor; and

a torque transmitting member disposed within a space formed

within said first and second rotors, said torque transmitting member being deformable elastically and undergoing a compressive deformation to transmit the torque that said first rotor has received to said second rotor, wherein

when a compressive load is not imposed on said torque transmitting member, a gap is formed between an inner wall of the space and said torque transmitting member.